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July 28, 2008

Cheri M. Ehrhardt
Natural Resource Planner
Merritt Island NWR Complex
P.O. Box 6504
Titusville, FL 32782

RE: Comments on the Draft CCP for Archie Carr National Wildlife Refuge

Dear Ms. Ehrhardt:

Thank you for the opportunity to comment as you develop the Comprehensive Conservation Plan ("CCP") for the Archie Carr National Wildlife Refuge ("Refuge" or "Archie Carr NWR"). Defenders of Wildlife ("Defenders") is a non-profit, public interest institution with over 1 million members and supporters nationwide, including over 188,000 in Florida. Defenders has been substantively involved in individual refuge issues as well as National Wildlife Refuge System policy for decades, and was instrumental in the passage of the National Wildlife Refuge System Improvement Act of 1997 ("Refuge Improvement Act"). Defenders has also been actively involved in the formulation of national policy guidance issued since passage of the Act, including policies addressing planning, compatibility, biological integrity, diversity, and environmental health, appropriate use, wilderness, and recreational use.

Defenders takes a special interest in the Refuge System planning process. For example, we published the *Citizen's Wildlife Refuge Planning Handbook* to encourage the public to become more involved in refuge planning. Defenders also publishes a regular report on significant threats to the Refuge System, *Refuges at Risk*, and featured nearby Merritt Island National Wildlife Refuge in our 2006 award-winning profile on refuges at elevated risk due to the various impacts of climate change.

Defenders applauds the CCP planner and staff at Archie Carr NWR for recognizing the magnitude of challenges imposed by climate change, and working to substantively address these threats on the refuge's ecological integrity and wildlife resources. Helping wildlife and habitat adapt to the effects of climate change, including sea level rise, warming atmospheric and ocean temperatures, unpredictable water availability and weather patterns, and the spread of invasive species will all be central to sustaining American wildlife and the environmental health of the Refuge System.

In order to strengthen the final CCP's treatment of climate change, Defenders recommends that climate change be listed as a refuge priority. While Defenders supports the priorities and actions that the refuge lists in the draft CCP, the complexity and range of challenges that climate change poses for a barrier island refuge such Archie Carr NWR merits it's listing as a priority on its own (draft CCP, pg. 70). Further, as one of the first national wildlife refuges in the nation to substantively

consider climate change in its CCP, further raising the profile of this issue can serve as inspiration and motivation for other refuges, planners and managers to begin tackling this challenge.

To assist the FWS in the identification of issues germane to this CCP, Defenders submits these comments to help strengthen the CCP/EA and management of the refuge.

I. Defenders Supports FWS Efforts to Address Climate Change Impacts in the Archie Carr NWR Draft CCP

The 1997 Refuge Improvement Act has been called "the most important statute Congress has passed for the Refuge System." (Fischman 2002). Prior to its enactment, the National Wildlife Refuge System was the lone remaining unit of federal public lands without an "organic" statute. See H. Rep. No. 105-106 at 3 (1997). Congress intended the Improvement Act to fill this void, by directing that the primary mission of the Refuge System is "to administer a national network of lands for the conservation . . . of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." 16 U.S.C. § 668dd(e)(1)(A).

The CCP process is the primary vehicle for ensuring that the Refuge System conservation mission is met. Under section 7 of the Improvement Act, FWS must issue a CCP at least once every 15 years that identifies and describes the purpose for which the refuge was created; the distribution, migration patterns, and abundance of fish, wildlife, and plant populations; the archeological and cultural values of the Refuge; and the opportunities for compatible wildlife-dependent recreational uses such as wildlife photography, environmental education, hunting, and fishing. In addition, the CCP must identify and describe the "significant problems that may adversely affect the populations and habitats of fish, wildlife, and plants" within the Refuge and identify "the actions necessary to correct or mitigate such problems." 16 U.S.C. § 668dd(e)(2)(E).

Defenders believes that climate change is among the most "significant problems" affecting plants and animals today, and thus the potential impacts of climate change should be a central consideration in the development of refuge CCPs under provisions of the Improvement Act.[1] As highlighted in Defenders' 2006 report on refuges and climate change, the need for such analysis is especially critical for refuges that are particularly vulnerable to climate change, including refuges in Alaska, refuges protecting wetland and grassland habitat in the prairie pothole region, and coastal refuges such as Archie Carr NWR, which are threatened by rising sea levels. Indeed, Congress in May 2006 specifically directed that FWS "should incorporate consideration of global warming and sea-level rise into the comprehensive conservation plans for coastal national wildlife refuges, and for other purposes."[2]

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[1] In addition, Department of the Interior Secretarial Order 3226, issued January 19, 2001, states that: "Each bureau and office of the Department will consider and analyze potential climate change impacts when undertaking long-range planning exercises, when setting priorities for scientific research and investigations, when developing multi-year management plans, and/or when making major decisions regarding the potential utilization of resources under the Department's purview. Departmental activities covered by this Order include, but are not limited to…management plans and activities developed for public lands."

[2] House Concurrent Resolution 398. The resolution states that: (1) the United States Fish and Wildlife Service should incorporate consideration of the effects of global warming and sea-level rise into the

II. THE CCP SHOULD PRIORITIZE CONSIDERATION OF THE IMPACTS OF CLIMATE CHANGE ON SEA TURTLES

As FWS is aware, its leadership on the Archie Carr NWR is particularly critical given its incredible importance to sea turtle conservation, with 25% of all loggerhead sea turtle and 35% of all green sea turtle nests in the U.S. occurring within its 20 miles of beach habitat. Without question, climate change poses pronounced threats to the continued survival of sea turtles, and the biological integrity, diversity, and environmental health of Archie Carr NWR. Adequately addressing the following issues will be essential to FWS's efforts to minimize the impacts of climate change on sea turtles, and in order to ensure that the Refuge remains one of the most important nesting sites for sea turtles in the western hemisphere. Further, raising the profile of these important issues now will help combat future threats to the Refuge, such as proposed infrastructure, resource extraction operations, and inappropriate recreation, and may be useful in compelling neighboring landowners and stakeholders to more carefully consider their impacts on imperiled sea turtles and other wildlife.

Sea Level Rise

As a barrier island refuge, Archie Carr NWR is particularly susceptible to sea level rise induced by climate change. In 2007, the Intergovernmental Panel on Climate Change (IPCC) concluded that average sea level will rise between 18 to 59 cm by the year 2100 (IPCC 2007). Under this scenario, coastal areas are at elevated risk of increased beach erosion, saltwater intrusion, storm surges and hurricane winds (Scavia et al. 2002). Rising sea level poses its own set of problems for nesting sea turtles by limiting females to more restricted areas of nesting habitat, and increasing egg vulnerability with higher high tides. As noted in the draft CCP, the refuge is fragmented and development has spread throughout the barrier island system, which restricts available nesting sites for sea turtles (draft CCP, pg.71). Defenders appreciates that the draft CCP recognizes this threat and has stated intention to monitor sea level and saltwater encroachment.

Beach Armoring

In response to rising sea level and increased beach erosion from climate change, people will likely increase beach armoring and beach nourishment; practices that already pose a threat to sea turtles, shorebirds, invertebrates and other wildlife, and natural coastal processes. Beach armoring involves the placement of rigid structures parallel to the beach to prevent the loss of residential and commercial structures. Residents along the coast currently rely on armoring to protect structures built close to shore. Beach armoring not only physically blocks females from reaching otherwise suitable nesting sites, but also permanently degrades nesting habitat by encouraging erosion, as sea wall structures redirect the tremendous energy from crashing waves seaward (Williams, 2006). We

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comprehensive conservation plan for each coastal national wildlife refuge; (2) each such comprehensive conservation plan should address, with respect to the refuge concerned, how global warming and sea-level rise will affect--(A) the ecological integrity of the refuge; (B) the distribution, migration patterns, and abundance of fish, wildlife, and plant populations and related habitats of the refuge; (C) the archaeological and cultural values of the refuge; (D) such areas within the refuge that are suitable for use as administrative sites or visitor facilities; and (E) opportunities for compatible wildlife-dependent recreational uses of the refuge; and (3) the Director of the United Fish and Wildlife Service, in consultation with the United States Geological Survey, should conduct an assessment of the potential impacts of global warming and sea-level rise on coastal national wildlife refuges.

agree with the draft CCP's acknowledgment that the construction of sea walls, rock revetments, and geotextile tubes are often ineffective and that instead, more beneficial practices of dune stabilization should be adopted to combat erosion (draft CCP, pg. 111). In light of the fact that these costly structures are continually battered by waves and storms, and are likely to become even more vulnerable with increased frequency and strength of hurricanes caused by warming seas, the refuge should endeavor to educate and discourage private property owners from building these largely ineffective structures in order to better preserve natural processes on coastal beaches and enable female sea turtles to nest properly. Only through outreach efforts will local communities and decision-makers realize that viable, less environmentally destructive alternatives exist for safeguarding both wildlife habitat and human infrastructure.

Beach Nourishment

Another frequent response to the natural and beneficial process of coastal erosion is so-called beach nourishment, the practice of pumping sand onto an eroded beach, which often proves ineffective, costly, and environmentally harmful. Although nourishment may provide a beach for sea turtle nesting, the sand deposited on beaches is typically dredged from elsewhere, which adversely impacts the dredge site and has different mineral content and size characteristics. This difference in composition may alter nest site selection and digging behavior, while sand color can alter the incubation temperature and thus the hatchling's sex ratio (NMFS, Office of Protected Resources 2007). These unnatural alterations compromise sea turtle nesting habitat and can result in decreased nesting success, abnormal nest construction and reduced survivorship of eggs and hatchlings. Therefore, Defenders strongly urges the Refuge to maintain its position that "if nourishment or other sand placement projects are to be implemented in the Archie Carr NWR area, then extra steps should be taken to ensure that the sand placement is designed to mimic the natural beach profile as close as possible and that the area of alteration be minimized as much as possible to allow beach organisms… enough nearby natural beach to withstand major impacts to the micro-environment in the project area" (draft CCP, pg. 111). We support this emphasis on mimicking natural processes and encourage the development of a similar position regarding beach armoring. Further, interesting and useful work regarding the application methods and design shapes of beach nourishment projects has been researched and conducted by biologists at Pea Island NWR in North Carolina, and we encourage dialogue with FWS staff from that station.

The refuge should also note that the frequency of proposed beach nourishment projects may increase due to the impacts of global warming, such as sea level rise and massive erosion due to intense storm events. Rising seas may eventually inundate off-refuge beaches as human development and impermeable barriers halt natural beach migration inland and upland (Velasquez-Manoff 2007). A concerted effort should therefore be made to prevent beach armoring or unnecessary beach nourishment on Archie Carr NWR to allow for natural migration of habitats, if possible, and only if such migration can happen at a sufficient rate that sea turtles and other wildlife are not stranded without habitat.

Sex Ratio Changes

Besides sea level rise, climate change may pose other challenges to nesting sea turtles, including the alteration of population sex ratios. As an ectothermic species whose sex is determined by the ambient temperature during incubation, the temperature of the sand directly affects the sex of sea turtle hatchlings (Weishampel et al., 2004). At higher temperatures more female offspring are produced, while at lower temperatures more male offspring are produced (Hawkes 2007). Florida's beaches, the primary nesting beaches for sea turtles such as loggerheads in the U.S., are already

skewed towards females, with less than 10 percent of eggs producing males (Hawkes 2007). In fact, an increase in only 1° Celsius could completely eliminate the birth of male turtles. The draft CCP makes note of possible future changes in sex ratios and Defenders supports efforts to increase research related to this phenomenon. We recommend that the final CCP including provisions that direct FWS to monitor the ambient temperatures of nesting sites, in order to enable the Refuge to anticipate and better understand changes in the sex ratios of sea turtle hatchlings.

Ocean Acidification

Ocean acidification is a problem that the draft CCP did not consider, but should. Although ocean acidification is unrelated to climate change, both problems do share the same cause, the high input of carbon into the atmosphere by humans. As oceans become more acidic from atmospheric carbon deposition, the shells of preferred sea turtle prey such as mollusks and crustaceans have difficulty forming, which could significantly impact the entire ocean food web but sea turtle prey in particular (Environmental News Network 2007). Defenders recommends that FWS identify and describe the potential impacts of ocean acidification on the Archie Carr NWR in the final CCP, and identify measures to address that threat. In addition, Defenders encourages the refuge to work in partnership with local, state and federal agencies to monitor ocean acidity and the status of the sea turtle prey populations of mollusks and crustaceans. In this way, the refuge will be aware and more prepared to deal with this building threat.

Research and Monitoring

Defenders supports the continued monitoring of sea turtles and their nesting areas in order to maintain the targets required by the refuge under the Endangered Species Act of 1973 (draft CCP, pg. 74), and plans to increase coordination with researchers to anticipate impacts of climate change (draft CCP, pg. 87). Specific surveys and data collection will be vital to anticipate the impacts of climate change on sea turtles, and establishing a scientific baseline for appropriately responding with adaptive management practices. Obtaining information whenever possible about potential shifts in the coast due to sea level rise and erosion will help the Refuge respond more effectively to the threats that climate change poses for nesting sea turtles and their greater ecosystem.

Shifts in Range and Land Acquisition

Defenders supports FWS's pledge in the draft CCP to "Evaluate inholdings for potential acquisition from willing sellers," (draft CCP, pg. 113). However, in order for such acquisitions to be effective, FWS must first gather and assemble information regarding shifts in the timing or location of nesting. This exercise will aid the refuge in adjusting to changes in sea turtle nesting patterns and determine if beaches currently outside the refuge will become important habitat for sea turtles. Because sea turtle species exhibit genetically-determined natal beach homing with strong nest-site fidelity, it is unknown whether sea turtles will adapt to new nesting sites if existing sites become submerged or are otherwise unsuitable, as mentioned in the *Petition to Designate the western North Atlantic Subpopulations of the Loggerhead Sea Turtle* ("Petition") submitted by Oceana and the Center for Biological Diversity in 2007. Monitoring of any shift in the timing or location of nesting will help the Refuge make strategic decisions about opportunities to acquire or cooperatively manage land currently now outside the Refuge. Defenders thus recommends that the final CCP prioritize the collection of information concerning the potential range shifts on the Archie Carr NWR, and subsequently work to establish refugia and new nesting beaches where appropriate.

Additional Stressors-- including Artificial Lighting, Pollution, Invasive Species, Vehicular Impacts

Defenders supports the draft CCP provisions to address other stressors to sea turtles, including protecting sea turtles from predators, as addressed in Project 7 of the draft CCP, reducing vehicle-wildlife collisions (draft CCP, pg. 112), and limiting night time beach access during sea turtle nesting season in Project 13 CCP draft, pg. 114). In addition to these measures, Defenders recommends that the final CCP contain additional measures to ensure that sea turtles are safeguarded from other stressors including pollution and trash, the encroachment of non-native, invasive vegetation, harassment and hunting of turtles and their eggs by humans, and artificial beach lighting. Artificial lighting not only impacts adult behavior, but also hatchlings, as they instinctively rely on visual cues to find the sea. As page 42 of the draft Loggerhead Recovery Plan states: "reports of hatchling disorientation events in Florida describe several hundred nests each year and are likely to involve tens of thousands of hatchlings" (Nelson *et al*. 2002). However, this number calculated from disorientation reports is likely a vast underestimate. In data collected in 1993 and 1994, Witherington *et al.* surveyed hatchling orientation at nests located at 23 representative beaches in six counties around Florida and found that approximately 10% to 30% of nests showed evidence of hatchlings disoriented by lighting. From this survey and from measures of hatchling production (Florida Fish and Wildlife Conservation Commission, unpublished data), the number of hatchlings disoriented by lighting in Florida is estimated to be in the range of <u>hundreds of thousands per year</u>. (emphasis added)

The impacts of artificial lighting may increase as beach levels rise from beach nourishment projects. Defenders supports the Refuge's proposed measures to increase law enforcement and to work with local jurisdictions to assist and educate them about lighting ordinances and enforcement (draft CCP, pg. 76).

Loggerhead Turtles Face Endangerment

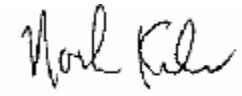
Though the loggerhead sea turtle is federally listed as threatened under the Endangered Species Act of 1973, the best available science currently shows that the species is now at the point of endangerment (Petition at 3). At Archie Carr NWR, loggerhead nesting has declined by 63 percent since 1998 (Appelson & Donnelly 2008). Due to the recent decline of the northern and Florida populations of loggerheads, and Archie Carr NWR's importance as a nesting site for loggerheads, Defenders recommends that the final CCP include all the various measures referenced above to safeguard loggerhead nesting sites in order to avoid the extirpation of the species.

III. Support for Alternative B

The serious threats that sea turtles and other species face now and in the future at the Archie Carr NWR lead Defenders to support Alternative B because of its comprehensive approach aimed at minimizing and mitigating the effects of climate change, while protecting sea turtles and other species from detrimental or inappropriate human activities. Monitoring variables affecting sea turtles and other imperiled species on the refuge, maintaining adequate law enforcement presence, and working in partnership with local communities and stakeholders will likely provide the refuge with the tools necessary to fulfill its conservation. Monitoring and understanding climate-related changes in real time, and other modern threats to wildlife and habitats, will be essential as the FWS works to adaptively manage and conserve the wildlife resources Archie Carr NWR was established to protect.

We hope our comments have been helpful in the development of the Archie Carr NWR draft CCP/EA and we look forward to participating in the planning process.

Sincerely,



Noah Kahn
Defenders of Wildlife

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